Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

CHEMISTRY **5070/12**

Paper 1 Multiple Choice **May/June 2016**

1 hour

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, glue or correction fluid.
Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.
DO **NOT** WRITE IN ANY BARCODES.

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A**, **B**, **C** and **D**.
Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
A copy of the Periodic Table is printed on page 16.
Electronic calculators may be used.

IB16 06_5070_12/4RP

1 Which row correctly identifies the gas?

	gas	test	observation
A	Cl_2	damp litmus paper	the litmus paper turns blue
B	NH_3	damp litmus paper	the litmus paper turns red
C	O_2	limewater	no change is observed
D	SO_2	acidified aqueous potassium manganate(VII)	the colour of the solution changes from purple to colourless

2 A student plans two experiments.

experiment 1 find the concentration of a solution of sodium hydroxide by titration with dilute hydrochloric acid

experiment 2 find the rate of the reaction between pieces of calcium carbonate and dilute hydrochloric acid by measuring the volume of gas given off every minute

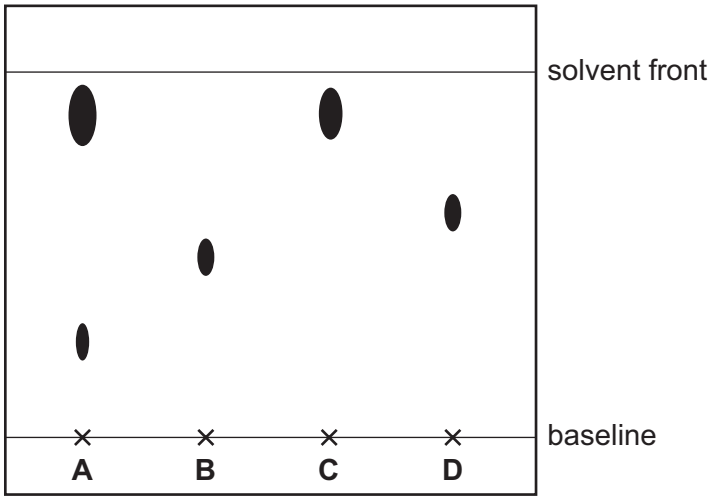
A flask is provided.

Which other apparatus is needed?

	experiment 1	experiment 2
A	balance, measuring cylinder, thermometer	gas syringe, clock
B	burette, pipette	balance, measuring cylinder, thermometer
C	burette, pipette	gas syringe, clock
D	gas syringe, clock	burette, pipette

3 Q is a pure sample of a substance that has a single R_f value of 0.9.

In the chromatogram shown, which letter represents Q?



4 Which statement about the isotopes of bromine is correct?

They are atoms with the same number of

A electrons and a different number of protons.

B neutrons and the same number of electrons.

C protons and the same chemical properties.

D protons and the same physical properties.

5 Compound Z is made from element X and element Y. Compound Z is a good conductor of electricity when molten but not when solid.

Which statement is correct?

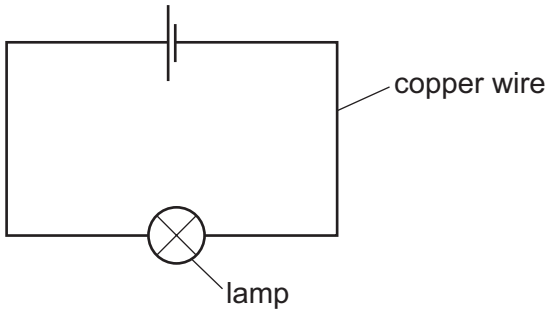
A Compound Z has strong forces of attraction between electrons and positive ions.

B Compound Z has strong forces of attraction between negative ions and positive ions.

C Elements X and Y are both metals.

D Elements X and Y are both non-metals.

6 Copper wire is used to complete an electrical circuit.



What happens in the copper wire?

A Electrons move along the wire to the negative terminal. Positive ions stay in position.

B Electrons move along the wire to the positive terminal. Positive ions move to the negative terminal.

C Electrons move along the wire to the positive terminal. Positive ions stay in position.

D Negative ions move along the wire to the positive terminal. Positive ions move to the negative terminal.

7 Which statement shows that graphite and diamond are different forms of the element carbon?

A Both graphite and diamond have giant molecular structures.

B Complete combustion of equal masses of graphite and diamond produces equal masses of carbon dioxide and no other products.

C Graphite and diamond have different melting points.

D Graphite conducts electricity, whereas diamond does not.

8 Ethene, C_2H_4, is a covalent compound with a simple molecular structure.

Which statement about ethene is correct?

A Ethene is a liquid at room temperature and pressure.

B Liquid ethene conducts electricity.

C One ethene molecule contains sixteen protons.

D The total number of shared pairs of electrons in ethene is five.

9 An organic compound has the molecular formula $C_8H_{16}O_4$.

What is the empirical formula of the compound?

A C_2H_4O **B** $C_4H_8O_2$ **C** $C_6H_{12}O_3$ **D** $C_8H_{16}O_4$

10 Compound **P** is the only substance formed when two volumes of ammonia gas react with one volume of carbon dioxide gas (both volumes being measured at r.t.p.).

What is the formula of **P**?

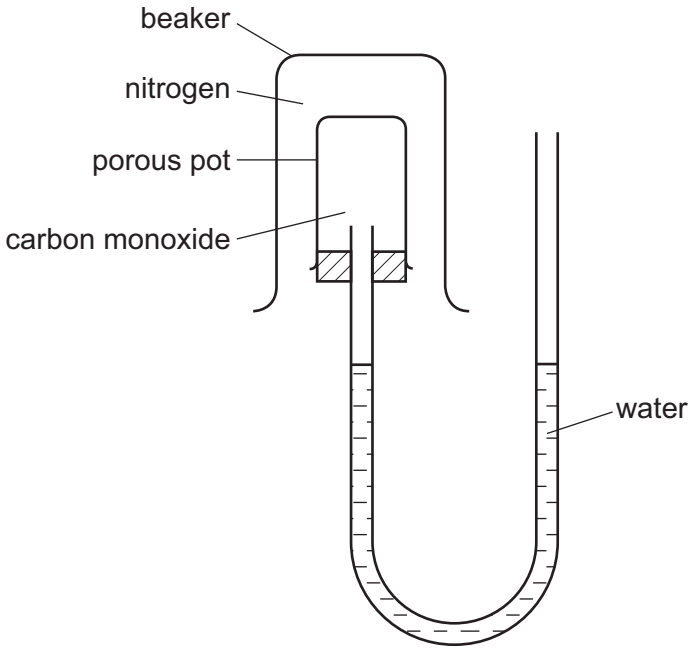
A $NH_2CO_2NH_4$

B $(NH_2)_2CO$

C $NH_4CO_2NH_4$

D $(NH_4)_2CO_3$

11 Gases can diffuse through porous pots. The diagram shows a beaker full of nitrogen inverted over a porous pot containing carbon monoxide.



The water level does not move.

Which statement explains this?

A Nitrogen is almost inert.

B The two gases have equal molecular masses.

C Both gases have two atoms in a molecule.

D Neither gas is soluble in water.

12 Copper is purified by electrolysis.

Which statement is **not** correct?

A Both electrodes contain copper.

B Copper is both oxidised and reduced in the process.

C Pure copper is deposited on the positive electrode.

D The electrolyte is aqueous copper(II) sulfate.

13 Concentrated aqueous sodium chloride is electrolysed using inert electrodes until no more chlorine gas is evolved.

What could be the pH of the resulting solution?

A 1 **B** 4 **C** 7 **D** 11

14 Ammonia can be produced industrially from nitrogen and hydrogen.

$$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$$

The forward reaction is exothermic.

Which change would **not** alter the yield of ammonia?

A adding a catalyst

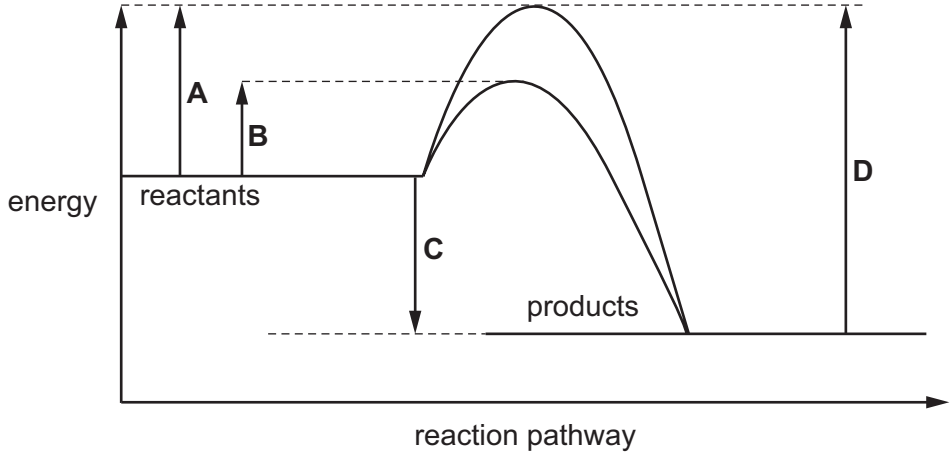
B decreasing the pressure

C decreasing the temperature

D removing some ammonia during the reaction

15 The diagram shows an energy profile diagram for a chemical reaction, both with and without a catalyst.

Which energy change is the activation energy for the catalysed reaction?



16 Oil floats on water.

Which statement is **not** true of oil and water?

A Oil and water are immiscible.

B Oil is less dense than water.

C Some molecules in oil have a higher relative molecular mass than water.

D The type of bonding within water molecules is different from the type of bonding within molecules in oil.

17 Which process does **not** involve the use of a catalyst?

A the extraction of iron from haematite in a blast furnace

B the manufacture of sulfur trioxide

C the production of ammonia from nitrogen and hydrogen

D the redox reactions that remove combustion pollutants from car exhausts

18 Which statement does **not** describe a reduction reaction?

A Electrons are gained during the reaction.

B Hydrogen is gained during the reaction.

C It takes place at the negative electrode during electrolysis.

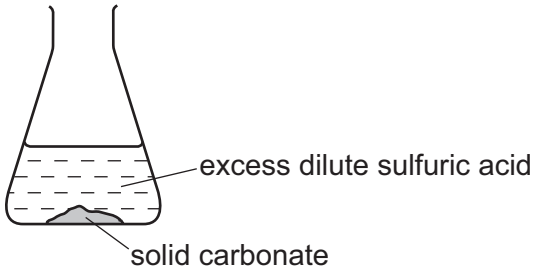
D Oxygen is gained during the reaction.

19 The pH of an aqueous solution of hydrochloric acid is 2.

What will be the pH of the acid after the addition of 10 g of sodium chloride?

A 1 **B** 2 **C** 7 **D** 9

20 One mole samples of each of the solid carbonates of lead, calcium, barium and magnesium are reacted in turn with excess dilute sulfuric acid.



Which sample of carbonate will release the greatest volume of carbon dioxide?

A barium

B calcium

C lead

D magnesium

21 In which reaction are two of the products salts?

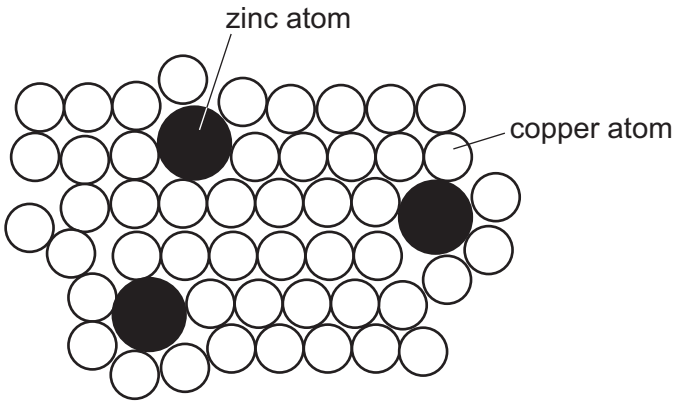
A aqueous lead(II) nitrate and aqueous copper(II) sulfate

B aqueous sodium hydroxide and solid ammonium sulfate

C dilute hydrochloric acid and aqueous sodium carbonate

D dilute hydrochloric acid and magnesium

22 The diagram shows the structure of brass.



Why is brass harder than pure copper?

A The zinc atoms form strong covalent bonds with the copper atoms.

B The zinc atoms prevent layers of copper atoms from sliding over each other easily.

C The zinc atoms prevent the ‘sea of electrons’ from moving freely in the solid.

D The zinc atoms have more electrons than the copper atoms.

23 From their position in the Periodic Table, which statement is correct?

A Atoms of elements in Group VII react to form ions by losing one electron.

B Iodine can displace bromine from its salts.

C Potassium reacts more rapidly than lithium with water to form the hydroxide and hydrogen.

D The melting point of caesium is greater than that of potassium.

24 The table gives the melting points, densities and electrical conductivities of four elements.

Which element is copper?

	melting point in °C	density in g / cm^3	electrical conductivity
A	–38.9	13.6	good
B	–7.2	3.12	poor
C	97.8	0.97	good
D	1083	8.96	good

25 An atom of an element has eight electrons only.

Which statement about this element is correct?

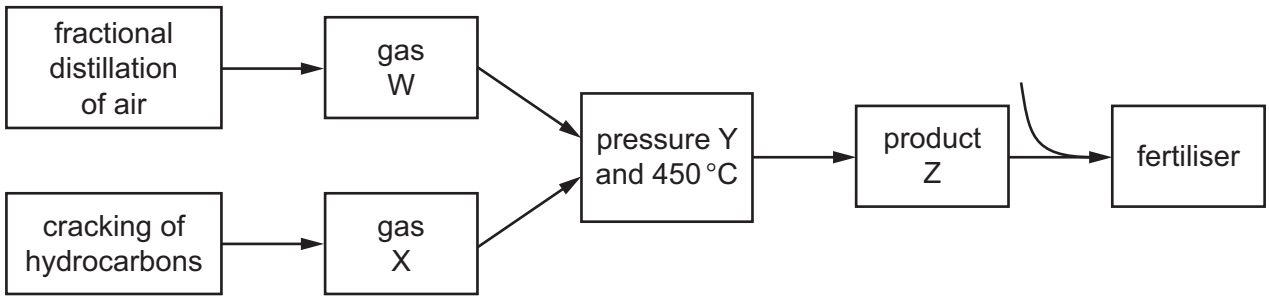
A It forms an ion with two negative charges.

B It has a full outer shell of electrons.

C It is a metal.

D It is in Group VIII of the Periodic Table.

26 The diagram shows a flow chart for the manufacture of fertiliser.



In the flow chart, what are W, X, Y and Z?

	W	X	Y	Z
A	H_2	N_2	high	NH_3
B	O_2	SO_2	high	SO_3
C	O_2	SO_2	low	SO_3
D	N_2	H_2	high	NH_3

[Turn over

27 Which oxide can be reduced to the metal by roasting with powdered iron?

A calcium oxide

B copper(II) oxide

C magnesium oxide

D zinc oxide

28 Which element, if attached to iron immersed in salt water, would prevent the iron from corroding?

A carbon

B copper

C magnesium

D sulfur

29 The final reaction in the extraction of metal *X* is represented by the following equation.

$$X_2O_3 + 3CO \rightarrow 2X + 3CO_2$$

What is *X*?

A aluminium

B copper

C iron

D sodium

30 Hydrated sodium carbonate decomposes when heated in a Bunsen burner flame.

Which equation shows this decomposition correctly?

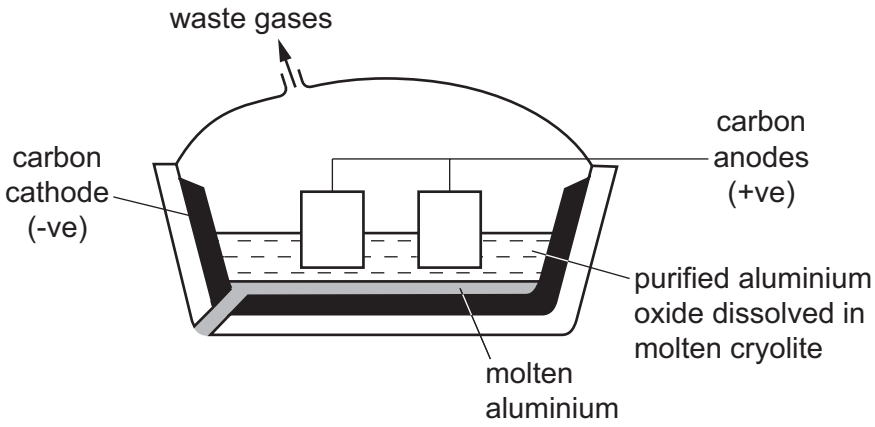
A $2Na_2CO_3.10H_2O(s) \rightarrow 4Na(s) + 2CO_2(g) + O_2(g) + 10H_2O(g)$

B $Na_2CO_3.10H_2O(s) \rightarrow Na_2CO_3(s) + 10H_2O(g)$

C $Na_2CO_3.10H_2O(s) \rightarrow NaHCO_3(s) + NaOH(s) + 9H_2O(g)$

D $Na_2CO_3.10H_2O(s) \rightarrow Na_2O(s) + CO_2(g) + 10H_2O(g)$

31 Aluminium is extracted from aluminium oxide by electrolysis.



Which statement about this electrolysis is correct?

A Aluminium ions gain electrons to form aluminium.

B Cryolite is added to increase the melting point of the electrolyte.

C Cryolite is added to react with impurities to form slag.

D The carbon cathode has to be replaced regularly as it reacts with oxygen.

32 Which ion is present in both sewage and fertilisers and can cause eutrophication when it enters rivers?

A carbonate

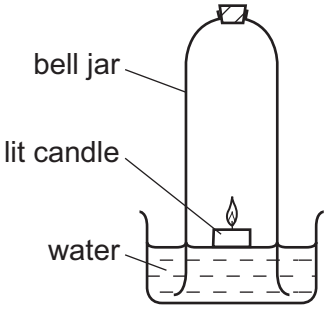
B chloride

C nitrate

D sulfate

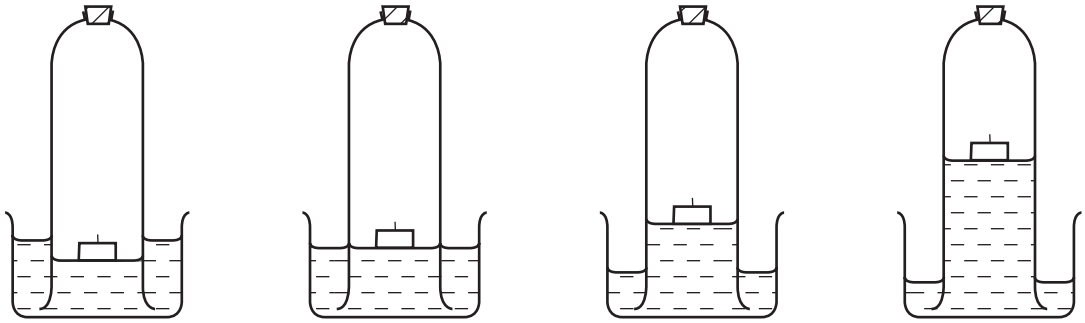
[Turn over

33 The diagram shows an experiment to determine the percentage of oxygen in air.

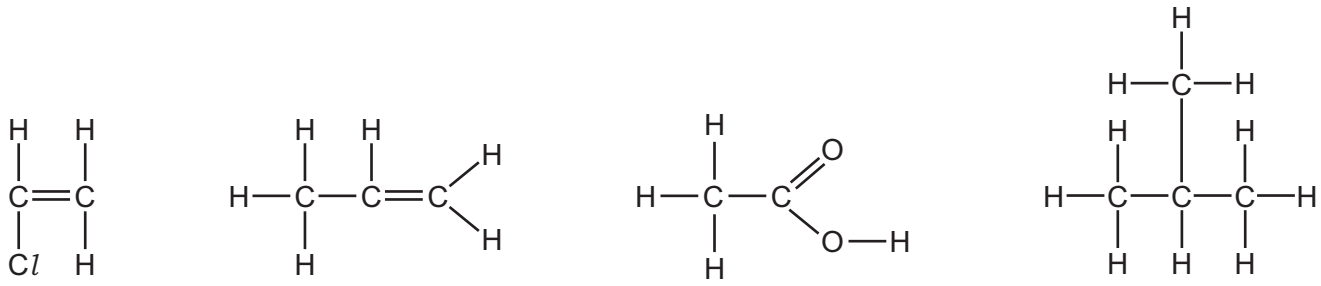


Which diagram shows the correct level of water after the candle stops burning?

A **B** **C** **D**



34 How many of the structures show an unsaturated hydrocarbon molecule?



A 1 **B** 2 **C** 3 **D** 4

35 Which statements are correct for alkenes but **not** for alkanes?

1 They turn aqueous bromine from brown to colourless.

2 Their general formula is C_nH_{2n}.

3 They burn in air to form carbon dioxide and water.

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

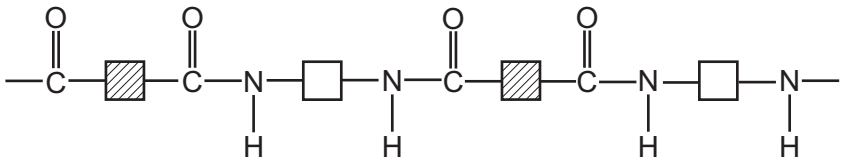
36 Wine is an alcoholic drink that contains ethanol. If wine is left exposed to the air for too long, it can become acidic.

This is because the ethanol is .....1..... to the acid .....2..... .

Which word and formula correctly complete gaps 1 and 2?

	1	2
A	oxidised	CH_3COOH
B	oxidised	CH_3CH_2COOH
C	reduced	CH_3COOH
D	reduced	CH_3CH_2COOH

37 Polymer Z has the structure shown.



These four terms can be used to describe polymers.

1 addition polymer

2 condensation polymer

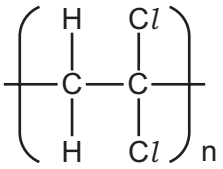
3 polyamide

4 polyester

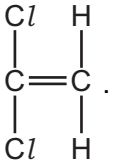
Which two terms can be applied to polymer Z?

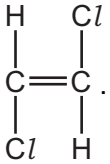
A 1 and 3 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

38 The diagram shows the structure of poly(dichloroethene).



Which statement about this polymer is correct?

A The monomer is  .

B The monomer is  .

C The polymer is formed by a condensation reaction.

D The polymer has a lower melting point than the monomer.

39 How can the following reaction be described?

$$C_8H_{18} \rightarrow C_4H_{10} + 2C_2H_4$$

A combustion

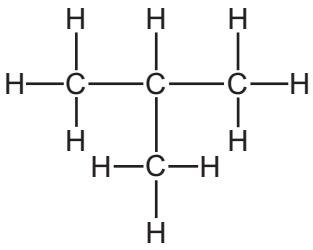
B cracking

C oxidation

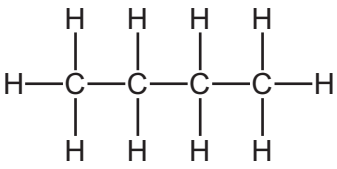
D reduction

40 The structures of four hydrocarbons, W, X, Y and Z, are shown.

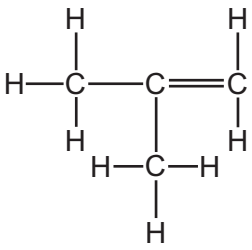
W



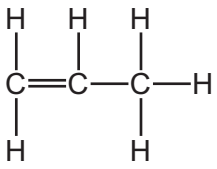
X



Y



Z



Which row is correct?

	isomers of each other	decolourise bromine	branched structures
A	W and X	Y and Z	W and Y
B	W and X	Y and Z	X and Z
C	Y and Z	W and Y	X and Z
D	Y and Z	W and Z	W and Y

The Periodic Table of Elements

Group																	
I	II											III	IV	V	VI	VII	VIII
							1 H hydrogen 1										2 He helium 4
3 Li lithium 7	4 Be beryllium 9											5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20
11 Na sodium 23	12 Mg magnesium 24											13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium –	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131
55 Cs caesium 133	56 Ba barium 137	57–71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium –	85 At astatine –	86 Rn radon –
87 Fr francium –	88 Ra radium –	89–103 actinoids	104 Rf rutherfordium –	105 Db dubnium –	106 Sg seaborgium –	107 Bh bohrium –	108 Hs hassium –	109 Mt meitnerium –	110 Ds darmstadtium –	111 Rg roentgenium –	112 Cn copernicium –		114 Fl flerovium –		116 Lv livermorium –		

Key

atomic number
atomic symbol
name
relative atomic mass

lanthanoids	57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium –	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
actinoids	89 Ac actinium –	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium –	94 Pu plutonium –	95 Am americium –	96 Cm curium –	97 Bk berkelium –	98 Cf californium –	99 Es einsteinium –	100 Fm fermium –	101 Md mendelevium –	102 No nobelium –	103 Lr lawrencium –

The volume of one mole of any gas is 24 dm^3 at room temperature and pressure (r.t.p.)